The Enigma of Ofu Lagoon, American Samoa

How Oceans Change Yet Some Things Stay the Same

Ofu Lagoon lies along the southern shore of Ofu Island in the National Park of American Samoa. The lagoon is separated from the ocean during low tide and is subject to large temperature fluctuations coupled with significant pH (acid level) and dissolved oxygen (DO) changes. Average daily temperatures, pH, and DO measurements are comparable to other coral reefs; however, substantial variations during the course of the day closely correspond with the tides (like a puddle heating up in the sun at low tide). The I&M Program established a series of monitoring stations in 2009 to develop a deeper understanding of environmental changes within the lagoon. Water quality measurements from these stations captured daily temperatures that regularly exceed 86°F, with variations greater than 8°F, pH changes exceeding 0.5pH units, and DO fluctuations of 50% - 200%. What this 'boils' down to is this lagoon, and the corals within it, experience extreme changes on a daily basis.

Despite fluctuations which have occurred for years, Ofu Lagoon appears somewhat healthy relative to other coral reefs, indicating that fairly healthy coral systems can persist even with significant environmental stressors. With global climate change expected to increase sea surface temperatures and decrease pH (oceans become more acidic), understanding why this particular coral reef system remains healthy is quite possibly a crucial piece of the global coral health puzzle.

Of major importance is the difference in pH levels between two study periods (data from 2009-2010 were compared with data from 2000-2001). While the lagoon is flushed daily by oceanic water it becomes more acidic, but the average change between these two study periods indicates that the water is even more acidic than before. Increasingly acidic water caused by increased atmospheric CO_2 (a greenhouse gas) is a concern for long-term coral health.

Despite experiencing environmental conditions that are known to stress corals, corals within this lagoon appear to be healthy. Continued research investigating Ofu Lagoon's coral reefs within the framework of global climate change may yield significant clues about world-wide coral vulnerability.

— T. Jones & K. Kageyama

This water quality measurement device records temperature, pH, dissolved oxygen, conductivity, chlorophyll, and more.

Scientists take water quality measurements on the shallow reef.

These colorful seascapes are typical of Ofu Lagoon.

Background: Ofu Lagoon